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Learning as an indirect, individual process operates through two overlapping school environments, the interpersonal (or extracurricular student teacher relationships) and the instructional. Two teaching abilities, interaction skills and planning or design skills, are necessary for the teacher to manipulate both environments effectively; however, training in interaction toward the development of instructional skills alone is emphasized in most teacher education programs. There has been some training in design skills, such as specifying behavioral objectives for the instructional environment, but teacher education programs should further include training in classifying instructional principles for each specified behavioral objective for both environments, a procedure which can be systematized into selection, comparison, and modification. Experimental instructional design and interpersonal interaction training programs were implemented at Stanford and Brigham Young universities with favorable results, however, to attain each skill at an adequate level often takes more time than is available. A horizontal plan of staff differentiation utilizing a team of teachers, each trained for and specializing in one teaching ability, would eliminate problems caused by possible inadequacies of an "all-purpose" teacher. (SM)

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INTERACTION AND DESIGN: TEACHER OR TEACHERS

M. David Merrill

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I-STEP (Individualized Secondary Teacher Education Program)
&
LESIN (Laboratory for the Experimental Study of Instruction)

College of Education

Brigham Young University

Provo, Utah

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Interaction and Design: Teacher or Teachers

M. David Merrill

While there exists some debate concerning the process, there is widespread agreement that a student learns from interacting with his environment. Furthermore, learning is a pervasive process that continues during every waking hour of an individual's life. There is no magic process by which a teacher can pour learning into the head of a student, nor any pen with which the teacher composes knowledge on the tabula rasa of the student's mind. Learning must always be indirect, operating through the intermediary of the environment. The only way that a teacher can have any influence on the student in such a way that his ongoing learning processes are facilitated and directed is by modifying the student's environment.

Two School Environments

Schools are established for the express purpose of providing particular kinds of environment where certain learning outcomes are more likely to occur than in the natural environment. Within a school, it is possible to identify at least two kinds of environment. The first, the interpersonal environment, results from the student's interactions with other students and teachers in a personal way where the purpose is not primarily the acquisition of particular skills or understandings. The second, the instructional environment, consists of the many stimulus situations designed specifically to bring about acquisition of a particular skill or understanding.[1]

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[1] See Merrill, M.D. "Instructional Design - A New Emphasis in Teacher Training," Educational Horizons, (1968), 47 (No. 1), pp. 9-20.

One of the most significant changes brought about in a student's behavior as a result of attending school is a change in the student's character and attitude resulting from the socializing processes amplified by the interpersonal environment of the school.

This environment provides an increased opportunity for students to associate and interact with a wide variety of other students, and to associate with adults, teachers, coaches, and occasionally administrators, in much closer contact than is possible in most other situations. Schools promote this social intercourse by sponsoring, in addition to their academic curricula, extracurricular activities designed to increase interpersonal contact with others. Activities like interschool athletics, intramural sports, special interest clubs (such as radio, drama, debate), school dances, and many other school sponsored events have as their primary, if not exclusive , purpose an increased opportunity for interpersonal interaction. In addition to formal extracurricular opportunities, teachers frequently strike up a very personal friendship with one or more students and spend considerable time serving as an adult listener and friend to these students. The opportunity for this close interpersonal relationship of adult and adolescent is much more frequent in school than in most other contexts.

Historically, the motivation for establishing public schools was primarily to provide an instructional environment in which students could learn specific skills and understandings more efficiently than they could in a more natural setting. The acquisition of these skills and understandings is for the most part a very individual process resulting from a student's struggle with a particular

stimulus situation or circumstance. While the instructional process is often made more economical by an organizational structure where groups of individuals can be instructed by a single teacher, nevertheless a very large portion of the learning which takes place is an individual matter. While the goals of the interpersonal experiences provided by the school are usually vague and frequently specified in only the most general of terms, the goals of the instructional environment are usually much more specific. Even though the specification of such objectives does not always meet the behavioral criterion of a Mager,[2] the objectives are almost always more specific than those specified for interpersonal situations. There is usually no attempt to evaluate outcomes resulting from interaction with the interpersonal environment. However, there is frequently an attempt to measure accomplishment in the instructional realm. While this evaluation is not always adequate, it is usually attempted. Materials and procedures which are almost exclusively part of the instructional environment include textbooks, filmstrips, lectures, workbooks, programs, and many other devices designed to provide a special kind of environment which appropriately assists the student to acquire the desired skill or understanding. It should be noted that many of these curriculum materials are presented to groups of students; nevertheless, the students' interaction with the material is mostly an individual matter. Being in a group contributes little, except economy, to the learning which takes place. For example, listening to a lecture or watching a film usually takes place in a group setting, but that which an individual student

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[2] Mager, Robert. Preparing Instructional Objectives, Palo Alto: Fearon, 1962.

learns from the experience depends on his individual and personal attention to the material being presented.

It should be obvious that the instructional and interpersonal environments are not mutually exclusive but rather provide overlapping categories. While many of the activities identified previously belong primarily to one or the other, there are a great many other activities which combine these two types of environment. Activities such as group discussion may have as a goal either instructional outcomes (i.e. the acquisition of specific skills and understandings), or may have as a primary goal some change in attitude or interest. In either case, both types of environment are combined in this activity and the student will be acquiring both affective as well as cognitive outcomes. Instructional activities often include role playing, group projects, committee work, and many other procedures which combine instructional and interpersonal environments. Again the goals may be primarily instructional or interpersonal, but whatever is specified, both are influenced by the situation. From time to time, individual students are tutored by a teacher or by other students. This is another instance of a combination of an interpersonal and instructional environment. While the goals may be primarily the acquisition of particular skills or understandings, affective outcomes are also a natural consequence of the situation.

Four Kinds of Teaching Skills

In the first paragraph of this paper, it was assumed that learning can only be influenced by manipulating the environment with which the student interacts.

Several kinds of instructional skills are required if the teacher is to be able to effectively manipulate both the interpersonal and instructional environments of the school. These instructional skills can be categorized into two types of skill; (1) interaction skills and (2) planning or design skills. Each of these categories can be further subdivided depending on the type of environment under consideration. This results in four categories of instructional abilities; (1) instructional interaction, (2) instructional design, (3) interpersonal interaction, and (4) interpersonal design. In teacher training programs, when there is an emphasis on specific skills, it is usually an emphasis on only one of these categories. Seldom does a program contain a comprehensive training program in all four areas. It is of interest to note that different educators have different views of the primary role of the teacher. These different perceptions frequently parallel the above categories. Tradition and practice have usually equated teaching with instructional interaction. A teacher is almost always pictured before a group of students explaining or discussing with the group. It is not surprising, therefore, that those attempts at training for specific skills which do exist in teacher preparation programs consist almost exclusively of training for instructional interaction. Student teaching, which in many programs carries most or all of the training in specific skills, usually concentrates on instructional interaction. The neophyte teacher is asked to observe the cooperating teacher at work. This observation is almost always of the master teacher presenting, explaining, discussing etc.

Video recording of a short teaching episode, often called micro teaching, is one of the most talked about innovations on the current teacher education scene. In a sense this technique is really just a refinement of the old student teaching idea. Instead of having the student serve as an apprentice to a master teacher under conditions where training is often unequal and where feedback to the trainee cannot be controlled, video recording of short teaching episodes allows the teacher preparation institution to concentrate a great deal of practice into a relatively short period of time with a maximum amount of feedback concerning the skills being developed. While its effectiveness as a technique has been demonstrated it should be noted that the emphasis is still principally on instructional interaction and the teacher as a display device.

During the summer of 1968, Robert Koff, Frederic J. McDonald, and M. David Merrill each directed a segment of Stanford University's Secondary Teacher Education Program (STEP). By agreement, influenced largely by personal preference, each of these segments emphasized a different set of instructional skills. McDonald's section placed the primary emphasis on skills of instructional interaction. The training program made extensive use of micro teaching to assist the teacher-trainees to attain certain specific instructional interaction skills. Video equipment was used both for allowing trainees to see themselves teach as well as to present models of the desired behavior to the student. These skills included classroom reinforcement, higher order questioning, silence, explaining, and other specific classroom presentation skills.[3]

[3] McDonald, Frederick J. "Research on the effect of modeling variables on learning teaching behaviors," symposium presented at 1969 AERA meetings.

The amount of training in instructional design contained in most teacher education programs is minimal. Lesson planning is a familiar topic but this process usually consists of procedures for outlining a presentation. To a minimal degree, teachers are instructed in techniques for using commercially prepared instructional materials and curriculum guides prepared by curriculum committees and state departments. In most programs, very little training is given in principles which would allow the teacher to be an effective designer of an instructional environment. The one design skill that is currently receiving widespread attention is that of specifying behavioral objectives. The advocates insist that objectives must be specified in terms of student behavior and must contain conditions under which the behavior will be observed and some criteria for acceptable performance. In most cases, design training stops here.

A more complete set of design skills would include at least a second step, training in the classification of instructional objectives. Such a skill is useful if, for each category of behavior in the classification system used, a unique set of instructional principles can be identified. While little is known about such principles, it is possible to identify some minimal conditions necessary for effective instruction for a particular behavioral outcome. In the author's work[4] a classification system derived from Gagne has been used.[5] For each behavioral

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[4] See Merrill, M.D. Components of a cybernetic instructional system. Educational Technology, 1968, 8(No. 7), 5-10.

Also Merrill, M.D. Educational Psychology for Instructional Design. To be published by Lippencott, 1969.

[5] Gagne, R.M. The Conditions of Learning, New York: Holt, 1965.

classification, three types of principles have been identified. These include selection procedures, comparison procedures, and modification procedures. Selection procedures are those principles which indicate the necessary characteristics for a particular kind of display and also the most effective sequence for a series of such displays. This set of selection procedures is believed to be unique for each kind of behavior identified by a classification system. Also associated with each kind of behavioral outcome is a unique set of comparison or evaluation procedures. These are principles which identify the conditions under which a procedure or particular kind of behavior can be observed. If these conditions are not observed then it is difficult or impossible to infer that the response observed was really of the type intended. The third set of procedures identifies ways to modify a particular instructional display if the responses resulting from such instruction are not those that were intended. Again it is believed that different kinds of behavioral outcomes are facilitated by different kinds of instructional modification.

During the spring of 1967, specific training in instructional design replaced a portion of the educational psychology content of Brigham Young University's single semester experimental teacher education program. During the summer of 1968, the author directed one section of Stanford University's Secondary Teacher Education Program. The exclusive emphasis of this section was the acquisition of instructional design skills. There was some limited experience at implementing designs before a small group of secondary students in a video recorded session, but unlike McDonald's group, described above, the emphasis was on an empirical tryout of particular design principles implemented in a particular presentation

rather than any concentration on instructional interaction skills. This past fall, a rather comprehensive unit on instructional design was again incorporated into the BYU experimental I-STEP program. Unlike the Stanford group, however, these students were also instructed in interpersonal interaction. In both the Stanford and BYU sessions, students indicated by means of a questionnaire that they felt design skills were extremely valuable in preparing them for teaching.

Most teacher training programs deal with problems of classroom management, but very few have any extensive training in skills required for effective interpersonal interaction. Extracurricular activities are conducted for the most part by persons who have never received any formal training in the management of groups and the conducting of group activities to capitalize on the unique learning outcomes possible through such activity. Dr. Koff's section of the Stanford program during the summer of 1968 emphasized training in specific skills of interpersonal interaction.[6]

Not only do most programs fail to include training for effective interpersonal interaction, but there is no teacher training program, to the author's knowledge, which attempts to provide training in skills required for designing interpersonal environments which are constructed to bring about specific behavioral changes in those participating in such environments. As indicated above, the goals of such interpersonal interaction situations are usually not very specific and are

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[6] A more extensive description of the skills involved was presented by Dr. Koff at the 1969 AERA meetings in Los Angeles.

stated in very general terms, (e.g., increased ability to socialize with others, responsibility, improved character, etc.). It is possible, however, to instruct potential teachers in principles which could be used to design interpersonal environments which would bring about specific, predictable behavioral changes in attitudes, interests, and preferences. Some of the principles outlined by Sherif and Sherif[7] in their work with boys in a summer camp have direct application to school situations but are seldom taught to teachers. Another source of such principles involves the use of contingency management[8] and conditioning models[9] to bring about specific changes in the emotional responses of students. There is not room to deal in depth with this important area except to identify the need for training teachers in specific interpersonal environment design skills.

Differentiated Teaching Teams

Teaching, in spite of the different skills identified above, has for some reason almost always been viewed as a unitary act, something that is done by a single person. Zealots have jealously guarded the sanctity of the unitary classroom and monarchical power of the classroom teacher. Even in the experimental program at Stanford, while the particular class of skills emphasized was different, each section attempted to train a solo teacher who would operate effectively in the classroom. The biases of the directors, rather than a careful analysis, determined the emphasis of the various sections. At Brigham Young University

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[7]Sherif, M. & Sherif, C.W., Reference Groups: Exploration into Conformity and Deviation of Adolescents (New York: Harper & Row, 1964).

[8]Homme, L.E., "Use of the Premack principle in controlling the behavior of nursery school children" J. Exptl. Anal. Behav., 6, 1963, 544.

[9]Staats, A.W. & Staats, C.K., Complex Human Behavior (New York: Holt, Rinehart & Winston, 1964).

there was a more unified attempt to represent each of the above skill areas in the training program, but nevertheless all trainees in the program receive all of the training experiences and are expected to attain all of the skills defined for the program. Perhaps the biggest problem in the BYU program is the necessity to compromise on some of the training experiences. To attain the skill at a level that is really adequate often takes more time than is available and hence the objective must be modified or eliminated from the program.

Team teaching has gained a wider and wider following during the past several years. In these team efforts the difference between team members and their unique contribution has almost never been a difference in teaching skills possessed by various members of the team, but rather, a difference in subject matter specialization. For example, a secondary English team might divide the responsibility on the basis of literature type, such as poetry, short stories, novels, drama, etc., with each team member being responsible for that area in which he is best prepared. It is certain that if the members of the team do have different teaching abilities or talents (as they are usually referred to by advocates of team teaching), these differences are not a result of training differences but rather a difference in preference or personality. Most likely all members of the team experienced a similar training experience.

There has been some effort to promote use of a differentiated staff during the past few years. This differentiation has usually taken the form of a vertical team arrangement where, rather than having several teachers all at the same level involved in the team, the team consists of several persons with different

levels of training. At the top is the master teacher who has seniority in experience and probably more advanced training than the other members of the differentiated team. Next are one or more teachers who have not yet gained the additional experience or have not completed very much advanced training beyond their basic certification requirements. A third level might consist of teacher trainees, student teachers, or interns who are in the process of certifying and are getting their first teaching experience as members of the differentiated team. The fourth level consists of one or more teacher aids. These persons are usually those who have not completed the formal training for teaching and may often consist of retired persons or housewives who have some college work but have not completed a degree or the requirements for certification. In some differentiated teams a further level is also present in the form of clerical or secretarial help.

The various skill areas identified above suggest another type of differentiated team in which the differentiation is horizontal rather than vertical. That is, rather than having a team which differs in amount of training this team would be differentiated in the kind of training received by team members. This difference would not merely be a difference in subject matter training but a difference in the teaching skills possessed by the different members of the team.

As an initial proposal, imagine a team consisting of four members. During the training experience one team member would concentrate his training in instructional design; a second, in interpersonal design; a third, in instructional interaction; and a fourth, in interpersonal interaction. The training

program could include a survey course which covered the skills in each of the areas and would be required by all trainees, but each trainee would receive considerable additional training in a particular area.

In practice teaching, students could be assigned as teams to a single teaching station; that is, all four teachers would be assigned to the same classroom and the same students. Team teaching by students is already being used in the BYU program, but not yet with differentiated teams.[10] The procedure for effective operation might be something like the following: (1) as a group the team would meet to select those objectives thought desirable for a given class; (2) the design specialists could then cast these objectives into appropriate behavioral form for effective instruction and interaction; (3) the design specialists could then analyze the objectives into an appropriate sequence and specify the conditions necessary for effective implementation; (4) other members of the team would assist at this point to gather appropriate materials for instruction; (5) those objectives which are most appropriately taught by group interaction could then become the responsibility of the specialist in interpersonal dynamics and he could prepare his plan for implementing a set of experiences with the students; (6) those objectives which are most appropriately taught by some instructional presentation would become the responsibility of the instructional interaction specialist who could then prepare his presentations; (7) exercises and other materials for self-instruction

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[10] Baird, J. Hugh, "I-STEP: An integration of interaction and design," symposium presented at 1969 AERA meetings.

could be prepared by the instructional design specialist in cooperation with the instructional interaction specialist and administered to the students in the most efficient manner available; (8) the design specialists could then review tests and other evaluative materials for the purpose of evaluating the design of the instruction and interpersonal interactions, and could use this data for revising future designs. Obviously these functions might be less clearly defined in the actual situation, but the fact remains that four teachers more extensively trained in each of these four areas than it is possible for a single teacher to be trained, should be better able to educate a group of students than would be a single teacher who only has each of these skills at a less developed level.

Four-member teams might not be the best. Experience may show that two functions, such as interpersonal design and interaction, should be combined. It may be that a single interpersonal dynamics specialist would be able to serve two teams consisting of instructional designers and interaction specialists. It is possible that aptitude and other variables might cause a disproportionate number of trainees to prefer one type of training over another. These and many other factors must still be determined by experience with such a procedure.

The obvious weakness in the previous student teaching proposal is that three or four teachers are operating where one was able to operate previously. For actual teaching, the solution is the same as for other team arrangements. Put three or four classrooms together; i.e., the teachers could now teach

from 60 to 120 students using the same procedure that was described above. It sould be apparent that this differentiated team could be combined with the vertical type of team arrangements previously described to provide teacher aids, student teachers, and clerks to the staff.

In summary, the purpose of this paper was to begin to define teaching skills that are frequently neglected in traditional teacher training programs and to identify briefly programs which are designed to produce teachers possessing these skills. An obvious fact is that most teacher educators represent only one or another of these different skill areas and are drawn to the particular skills they possess by virtue of their own training, background and interest. Very few are expert in interpersonal and instructional design and interaction, but rather each is a specialist. Perhaps, like their mentors, the all-purpose teachers who possess all kinds of skills represent an unrealistic picture. Is it possible that different teachers should be trained with different types of teaching skills, rather than a single teacher, who has a little of everything but a lot of nothing?